FCC TEST REPORT
(15.407)

REPORT NO.:	RF141007C29-1
MODEL NO.:	WNDR4500v3
FCC ID:	PY314200277
RECEIVED:	Oct. 07, 2014
TESTED:	Oct. 14 ~ Dec. 26, 2014
ISSUED:	Dec. 27, 2014

APPLICANT:	NETGEAR INC.
ADDRESS:	350 East Plumeria Drive, San Jose, CA 95134, USA

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.
TEST LOCATION:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF141007C29-1	Original release.	Dec. 27, 2014

1. CERTIFICATION

PRODUCT:	N900 Wireless Dual Band Gigabit Router
MODEL:	WNDR4500v3
BRAND:	Netgear
APPLICANT:	NETGEAR INC.
TESTED:	Oct. 14 ~ Dec. 26, 2014
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart E (Section 15.407)**

The above equipment (model: WNDR4500v3) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Celine Chou **, DATE :** Dec. 27, 2014

Celine Chou / Specialist

APPROVED BY : Ken Liu **, DATE :** Dec. 27, 2014

Ken Liu / Senior Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.407(b)(6)	AC Power Conducted Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.59dB at 0.41560MHz.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5000.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is I-PEX(MHF) not a standard connector.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 dB
	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	N900 Wireless Dual Band Gigabit Router
MODEL NO.	WNDR4500v3
POWER SUPPLY	12Vdc (Adapter)
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK
MODULATION TECHNOLOGY	OFDM
TRANSFER RATE	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 450.0Mbps
OPERATING FREQUENCY	5180 ~ 5240MHz
NUMBER OF CHANNEL	4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	600.768mW
ANTENNA TYPE	Refer to note
ANTENNA CONNECTOR	Refer to note
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

1. The EUT incorporates a MIMO function. Physically, the EUT provides three completed transmitters and three receivers.

MODULATION MODE	TX FUNCTION
802.11a	3TX
802.11n (20MHz)	3TX
802.11n (40MHz)	3TX

2. The EUT consumes power from the following adapter.

ADAPTER 1	
BRAND	NETGEAR
MODEL	MU30-5120250-A1
PART NO.	332-10234-01
INPUT POWER	100-240Vac, 50/60Hz, 0.8A
OUTPUT POWER	12Vdc, 2.5A
POWER LINE	1.8m cable without core attached on adapter

ADAPTER 2	
BRAND	NETGEAR
MODEL	P030WF120B 11200-6LF
PART NO.	332-10200-02
INPUT POWER	100-240Vac, 50/60Hz, 1.0A
OUTPUT POWER	12Vdc, 2.5A
POWER LINE	1.8m cable without core attached on adapter

ADAPTER 3	
BRAND	NETGEAR
MODEL	SAS030F1 NA
PART NO.	332-10451-01
INPUT POWER	100-120Vac, 47-63Hz, 0.9A
OUTPUT POWER	12Vdc, 2.5A
POWER LINE	1.8m cable without core attached on adapter

3. The following antennas were provided to the EUT.

Ant. NO.	Brand	Model	Ant. Type	Connecter Type	Antenna Gain(dBi) Including cable loss	
					2.4GHz	5.0GHz
1, 2	Master Wave Technology Co., Ltd.	98P2LPIPF000	PCB	i-pex(MHF)	3.37	3.03
3	Master Wave Technology Co., Ltd.	98P2LPIPF001	PCB	i-pex(MHF)	2.64	3.31

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 DESCRIPTION OF TEST MODES

4 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	-	√	√	-	Adapter 1
B	√	√	√	√	Adapter 2
C	-	√	√	-	Adapter 3

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

RADIATED EMISSION TEST (ABOVE 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
B	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
B	802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	7.2
B	802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	15.0

RADIATED EMISSION TEST (BELOW 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B, C	802.11a	36 to 48	36	OFDM	BPSK	6.0

POWER LINE CONDUCTED EMISSION TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B, C	802.11a	36 to 48	36	OFDM	BPSK	6.0

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
B	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
B	802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	7.2
B	802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	15.0

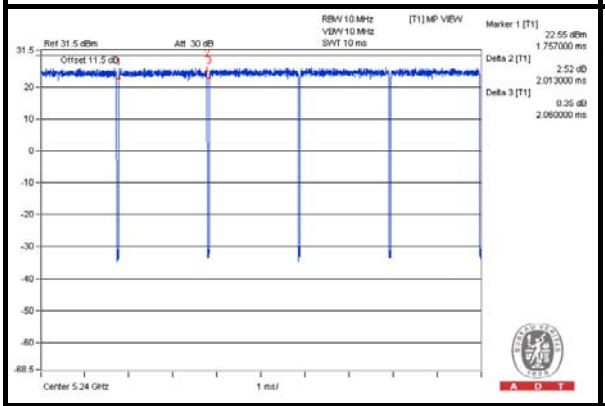
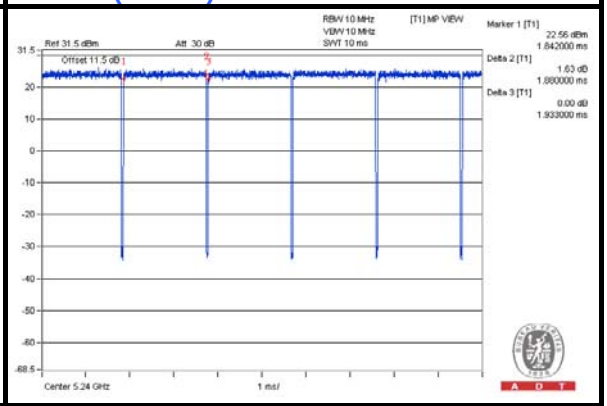
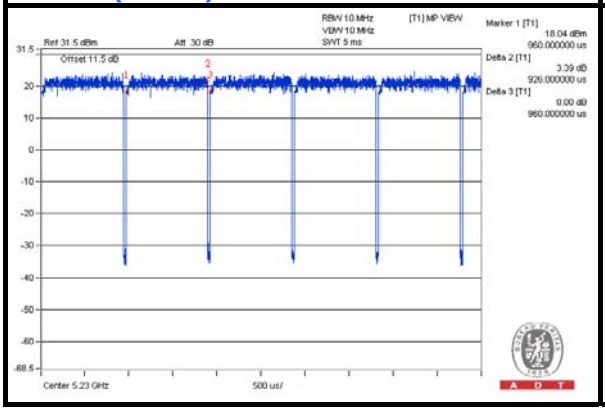
TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	22deg. C, 63%RH	120Vac, 60Hz	Alan Wu
RE<1G	25deg. C, 64%RH	120Vac, 60Hz	Alan Wu
PLC	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jun Wu

3.3 DUTY CYCLE OF TEST SIGNAL

Duty cycle of test signal is < 98 %, duty factor is required.

802.11a: Duty cycle = 2.013/2.060 = 0.977, Duty factor = 10 * log(1/0.977) = 0.10
802.11n (20MHz): Duty cycle = 1.880/1.933 = 0.973, Duty factor = 10 * log(1/0.973) = 0.12
802.11n (40MHz): Duty cycle = 0.926/0.960 = 0.965, Duty factor = 10 * log(1/0.965) = 0.16

802.11a	802.11n (20MHz)
	
802.11n (40MHz)	
	

3.4 DESCRIPTION OF SUPPORT UNITS

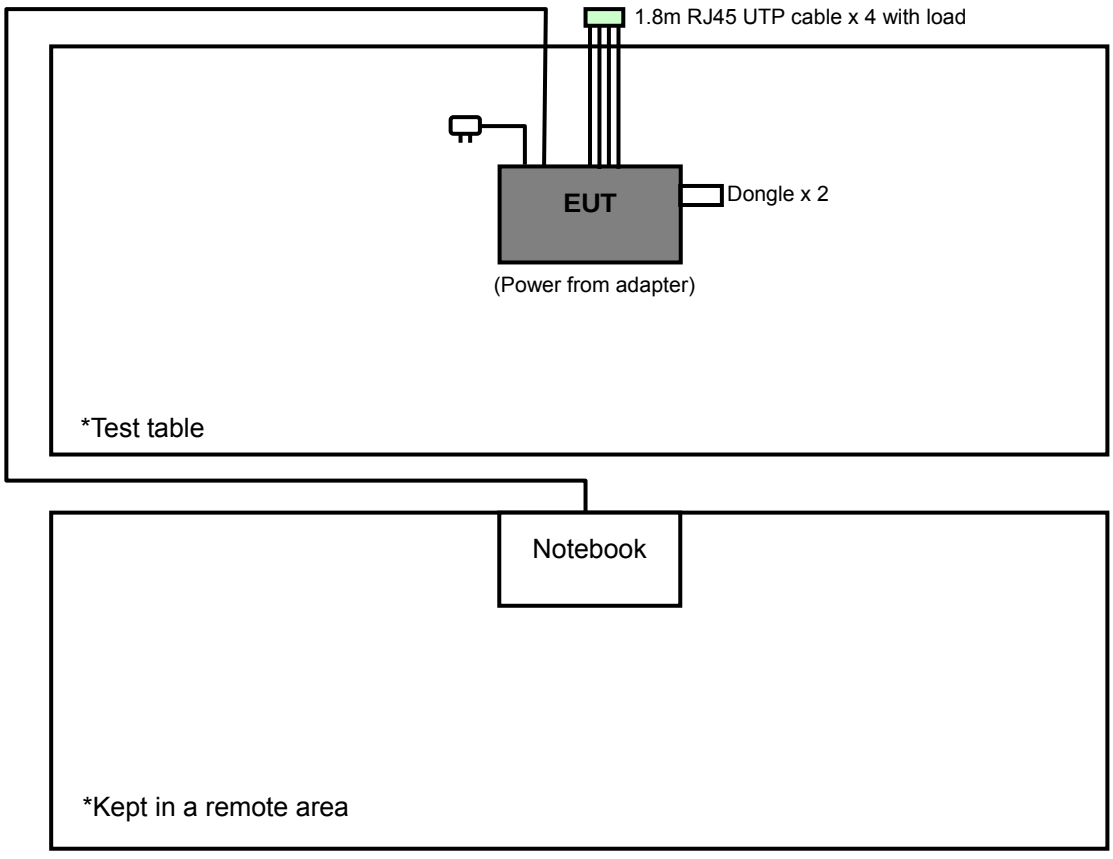
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5420	BPQ8MQ1	FCC DoC Approved
2	Dongle	SANDISK	SDCZ6-1024	NA	NA
3	Dongle	SANDISK	SDCZ6-1024	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 cable
2	NA
3	NA

NOTE:
1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as a communication partner to transfer data.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST



3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specification of the EUT declared by the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)
789033 D02 General UNII Test Procedures New Rules v01
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedures New Rules v01	FIELD STRENGTH AT 3m	
	PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
APPLICABLE TO	**EIRP LIMIT**	**EQUIVALENT FIELD STRENGTH AT 3m**
15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK: -27 (dBm/MHz) *1 PK: -17 (dBm/MHz) *2	PK: 68.2 (dBμV/m) *1 PK: 78.2 (dBμV/m) *2

NOTE: *1 beyond 10MHz of the band edge *2 within 10 MHz of band edge

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 06, 2014	Oct. 05, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSU 43	100115	Dec. 18, 2013	Dec. 17, 2014
			Dec. 18, 2014	Dec. 17, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 26, 2014	Feb. 25, 2015
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Jan. 05, 2014	Jan. 04, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 17, 2014	Feb. 16, 2015
Preamplifier Agilent	8449B	3008A01961	Oct. 28, 2013	Oct. 27, 2014
			Oct. 18, 2014	Oct. 17, 2015
Preamplifier Agilent	8447D	2944A10738	Oct. 28, 2013	Oct. 27, 2014
			Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 09, 2014	Aug. 08, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
			Oct. 18, 2014	Oct. 17, 2015
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 09, 2014	Jun. 08, 2015

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 4.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 460141.

5. The IC Site Registration No. is IC7450F-4.

4.1.4 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

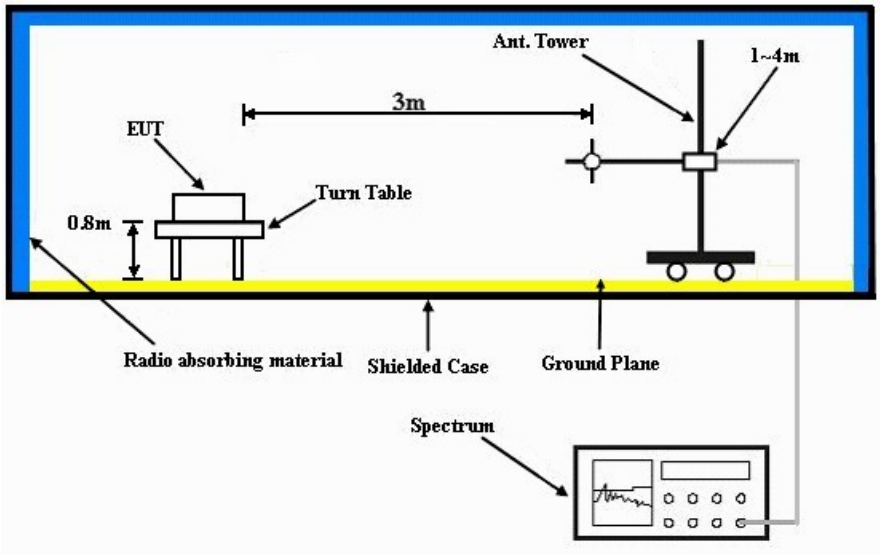
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.5 DEVIATION FROM TEST STANDARD

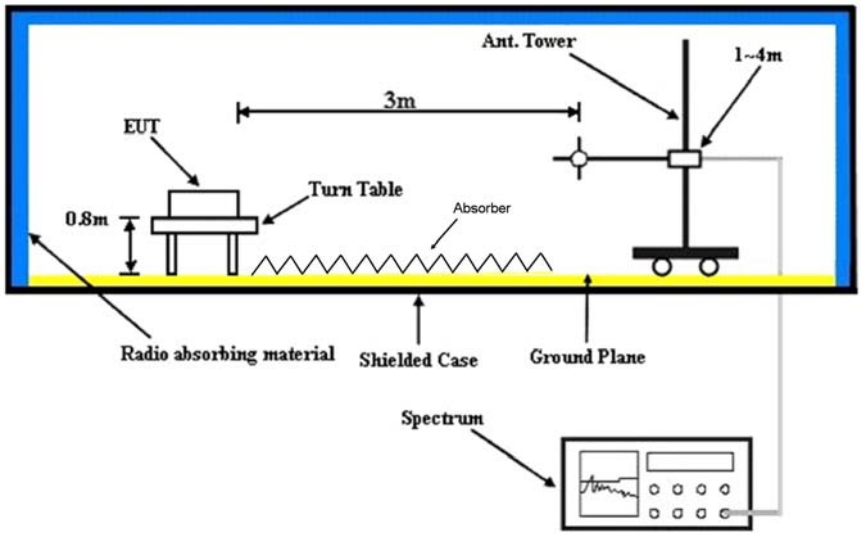
No deviation.

4.1.6 TEST SETUP

Frequency range 30MHz~1GHz



Frequency range above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.7 EUT OPERATING CONDITION

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".
e. The necessary accessories enabled the system in full functions.

4.1.8 TEST RESULTS

ABOVE 1GHz DATA

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	70.9 PK	74.0	-3.1	1.06 H	90	65.20	5.70
2	5150.00	53.1 AV	54.0	-0.9	1.06 H	90	47.40	5.70
3	*5180.00	115.8 PK			1.06 H	90	76.30	39.50
4	*5180.00	105.5 AV			1.06 H	90	66.00	39.50
5	#10360.00	62.8 PK	74.0	-11.2	1.00 H	163	45.10	17.70
6	#10360.00	49.1 AV	54.0	-4.9	1.00 H	163	31.40	17.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	71.5 PK	74.0	-2.5	1.00 V	249	65.80	5.70
2	5150.00	53.5 AV	54.0	-0.5	1.00 V	249	47.80	5.70
3	*5180.00	118.9 PK			1.00 V	249	79.40	39.50
4	*5180.00	109.3 AV			1.00 V	249	69.80	39.50
5	#10360.00	64.0 PK	74.0	-10.0	1.00 V	105	46.30	17.70
6	#10360.00	50.6 AV	54.0	-3.4	1.00 V	105	32.90	17.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	59.9 PK	74.0	-14.1	1.00 H	101	54.50	5.40
2	5000.00	50.4 AV	54.0	-3.6	1.00 H	101	45.00	5.40
3	*5200.00	116.1 PK			1.06 H	93	76.50	39.60
4	*5200.00	106.0 AV			1.06 H	93	66.40	39.60
5	#10400.00	63.5 PK	74.0	-10.5	1.00 H	161	45.80	17.70
6	#10400.00	49.7 AV	54.0	-4.3	1.00 H	161	32.00	17.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	61.6 PK	74.0	-12.4	1.00 V	326	56.20	5.40
2	5000.00	53.8 AV	54.0	-0.2	1.00 V	326	48.40	5.40
3	*5200.00	118.7 PK			1.00 V	235	79.10	39.60
4	*5200.00	109.1 AV			1.00 V	235	69.50	39.60
5	#10400.00	64.1 PK	74.0	-9.9	1.00 V	110	46.40	17.70
6	#10400.00	50.9 AV	54.0	-3.1	1.00 V	110	33.20	17.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	59.6 PK	74.0	-14.4	1.00 H	100	54.20	5.40
2	5000.00	50.0 AV	54.0	-4.0	1.00 H	100	44.60	5.40
3	*5240.00	118.2 PK			1.08 H	92	78.60	39.60
4	*5240.00	108.4 AV			1.08 H	92	68.80	39.60
5	5360.00	59.8 PK	74.0	-14.2	1.09 H	99	54.00	5.80
6	5360.00	49.8 AV	54.0	-4.2	1.09 H	99	44.00	5.80
7	#10480.00	63.3 PK	74.0	-10.7	1.00 H	168	45.70	17.60
8	#10480.00	49.4 AV	54.0	-4.6	1.00 H	168	31.80	17.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	61.4 PK	74.0	-12.6	1.00 V	328	56.00	5.40
2	5000.00	53.2 AV	54.0	-0.8	1.00 V	328	47.80	5.40
3	*5240.00	120.2 PK			1.00 V	228	80.60	39.60
4	*5240.00	110.4 AV			1.00 V	228	70.80	39.60
5	5360.00	61.4 PK	74.0	-12.6	1.00 V	223	55.60	5.80
6	5360.00	50.6 AV	54.0	-3.4	1.00 V	223	44.80	5.80
7	#10480.00	64.9 PK	74.0	-9.1	1.00 V	102	47.30	17.60
8	#10480.00	50.7 AV	54.0	-3.3	1.00 V	102	33.10	17.60

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11n (20MHz)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.4 PK	74.0	-4.6	1.08 H	86	63.70	5.70
2	5150.00	52.4 AV	54.0	-1.6	1.08 H	86	46.70	5.70
3	*5180.00	113.9 PK			1.08 H	86	74.40	39.50
4	*5180.00	103.9 AV			1.08 H	86	64.40	39.50
5	#10360.00	62.7 PK	74.0	-11.3	1.00 H	160	45.00	17.70
6	#10360.00	48.5 AV	54.0	-5.5	1.00 H	160	30.80	17.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	71.7 PK	74.0	-2.3	1.31 V	252	66.00	5.70
2	5150.00	53.6 AV	54.0	-0.4	1.31 V	252	47.90	5.70
3	*5180.00	117.8 PK			1.31 V	252	78.30	39.50
4	*5180.00	107.4 AV			1.31 V	252	67.90	39.50
5	#10360.00	63.8 PK	74.0	-10.2	1.00 V	101	46.10	17.70
6	#10360.00	50.5 AV	54.0	-3.5	1.00 V	101	32.80	17.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	60.1 PK	74.0	-13.9	1.00 H	107	54.70	5.40
2	5000.00	50.2 AV	54.0	-3.8	1.00 H	107	44.80	5.40
3	*5200.00	116.6 PK			1.00 H	86	77.00	39.60
4	*5200.00	106.5 AV			1.00 H	86	66.90	39.60
5	#10400.00	63.9 PK	74.0	-10.1	1.00 H	167	46.20	17.70
6	#10400.00	50.1 AV	54.0	-3.9	1.00 H	167	32.40	17.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	62.9 PK	74.0	-11.1	1.00 V	327	57.50	5.40
2	**5000.00**	**53.9 AV**	**54.0**	**-0.1**	**1.00 V**	**327**	**48.50**	**5.40**
3	*5200.00	121.4 PK			1.29 V	253	81.80	39.60
4	*5200.00	110.8 AV			1.29 V	253	71.20	39.60
5	#10400.00	64.9 PK	74.0	-9.1	1.00 V	110	47.20	17.70
6	#10400.00	51.0 AV	54.0	-3.0	1.00 V	110	33.30	17.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	59.4 PK	74.0	-14.6	1.00 H	102	54.00	5.40
2	5000.00	49.6 AV	54.0	-4.4	1.00 H	102	44.20	5.40
3	*5240.00	117.5 PK			1.05 H	92	77.90	39.60
4	*5240.00	107.5 AV			1.05 H	92	67.90	39.60
5	5360.00	60.0 PK	74.0	-14.0	1.03 H	99	54.20	5.80
6	5360.00	50.2 AV	54.0	-3.8	1.03 H	99	44.40	5.80
7	#10480.00	63.2 PK	74.0	-10.8	1.00 H	162	45.60	17.60
8	#10480.00	49.3 AV	54.0	-4.7	1.00 H	162	31.70	17.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	61.9 PK	74.0	-12.1	1.00 V	328	56.50	5.40
2	5000.00	53.3 AV	54.0	-0.7	1.00 V	328	47.90	5.40
3	*5240.00	120.6 PK			1.00 V	226	81.00	39.60
4	*5240.00	110.0 AV			1.00 V	226	70.40	39.60
5	5360.00	61.4 PK	74.0	-12.6	1.00 V	229	55.60	5.80
6	5360.00	51.5 AV	54.0	-2.5	1.00 V	229	45.70	5.80
7	#10480.00	64.1 PK	74.0	-9.9	1.00 V	109	46.50	17.60
8	#10480.00	50.6 AV	54.0	-3.4	1.00 V	109	33.00	17.60

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11n (40MHz)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.1 PK	74.0	-8.9	1.06 H	91	59.40	5.70
2	5150.00	51.5 AV	54.0	-2.5	1.06 H	91	45.80	5.70
3	*5190.00	108.7 PK			1.06 H	91	69.20	39.50
4	*5190.00	97.9 AV			1.06 H	91	58.40	39.50
5	#10380.00	61.5 PK	74.0	-12.5	1.00 H	168	43.80	17.70
6	#10380.00	47.4 AV	54.0	-6.6	1.00 H	168	29.70	17.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	70.4 PK	74.0	-3.6	1.02 V	226	64.70	5.70
2	5150.00	53.8 AV	54.0	-0.2	1.02 V	226	48.10	5.70
3	*5190.00	110.6 PK			1.02 V	226	71.10	39.50
4	*5190.00	100.0 AV			1.02 V	226	60.50	39.50
5	#10380.00	62.8 PK	74.0	-11.2	1.00 V	111	45.10	17.70
6	#10380.00	49.1 AV	54.0	-4.9	1.00 V	111	31.40	17.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 46	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	59.2 PK	74.0	-14.8	1.00 H	104	53.80	5.40
2	5000.00	49.4 AV	54.0	-4.6	1.00 H	104	44.00	5.40
3	5150.00	66.2 PK	74.0	-7.8	1.00 H	86	60.50	5.70
4	5150.00	52.0 AV	54.0	-2.0	1.00 H	86	46.30	5.70
5	*5230.00	113.5 PK			1.00 H	86	73.90	39.60
6	*5230.00	103.0 AV			1.00 H	86	63.40	39.60
7	#10460.00	62.1 PK	74.0	-11.9	1.00 H	164	44.50	17.60
8	#10460.00	48.1 AV	54.0	-5.9	1.00 H	164	30.50	17.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	61.8 PK	74.0	-12.2	1.00 V	327	56.40	5.40
2	5000.00	52.9 AV	54.0	-1.1	1.00 V	327	47.50	5.40
3	5150.00	70.6 PK	74.0	-3.4	1.02 V	184	64.90	5.70
4	5150.00	53.4 AV	54.0	-0.6	1.02 V	184	47.70	5.70
5	*5230.00	116.9 PK			1.02 V	184	77.30	39.60
6	*5230.00	106.8 AV			1.02 V	184	67.20	39.60
7	#10460.00	63.0 PK	74.0	-11.0	1.00 V	103	45.40	17.60
8	#10460.00	49.3 AV	54.0	-4.7	1.00 V	103	31.70	17.60

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	45.42	27.7 QP	40.0	-12.3	1.24 H	154	41.90	-14.20
2	148.26	29.8 QP	43.5	-13.7	1.49 H	247	43.50	-13.70
3	375.29	29.7 QP	46.0	-16.3	1.00 H	70	40.80	-11.10
4	499.48	37.8 QP	46.0	-8.2	1.00 H	141	46.70	-8.90
5	625.60	32.5 QP	46.0	-13.5	1.00 H	141	38.70	-6.20
6	749.79	31.9 QP	46.0	-14.1	1.00 H	142	35.50	-3.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	45.42	36.1 QP	40.0	-3.9	1.00 V	146	50.30	-14.20
2	88.11	27.6 QP	43.5	-15.9	2.00 V	13	47.10	-19.50
3	101.69	27.3 QP	43.5	-16.2	1.00 V	75	45.40	-18.10
4	286.03	26.8 QP	46.0	-19.2	1.24 V	352	39.50	-12.70
5	437.38	29.3 QP	46.0	-16.7	1.00 V	208	39.20	-9.90
6	778.89	29.0 QP	46.0	-17.0	1.00 V	215	32.30	-3.30

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 36	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	**TEST MODE**	B

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	41.54	24.9 QP	40.0	-15.1	1.24 H	108	39.40	-14.50
2	130.80	34.0 QP	43.5	-9.5	1.24 H	241	49.20	-15.20
3	190.95	28.0 QP	43.5	-15.5	1.00 H	289	44.30	-16.30
4	324.84	25.9 QP	46.0	-20.1	3.00 H	0	37.70	-11.80
5	625.60	26.0 QP	46.0	-20.0	1.00 H	268	32.20	-6.20
6	749.79	27.8 QP	46.0	-18.2	1.00 H	235	31.40	-3.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	41.54	36.4 QP	40.0	-3.6	1.24 V	82	50.90	-14.50
2	86.17	34.5 QP	40.0	-5.5	1.24 V	322	53.80	-19.30
3	130.80	36.1 QP	43.5	-7.4	2.00 V	194	51.30	-15.20
4	286.03	24.8 QP	46.0	-21.2	1.24 V	332	37.50	-12.70
5	437.38	25.0 QP	46.0	-21.0	1.00 V	211	34.90	-9.90
6	749.79	27.5 QP	46.0	-18.5	1.24 V	164	31.10	-3.60

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	C

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.60	23.9 QP	40.0	-16.1	1.24 H	142	38.50	-14.60
2	88.11	24.4 QP	43.5	-19.1	2.00 H	114	43.90	-19.50
3	123.04	30.0 QP	43.5	-13.5	1.24 H	273	45.80	-15.80
4	206.48	27.5 QP	43.5	-16.0	1.24 H	80	44.00	-16.50
5	450.97	27.6 QP	46.0	-18.4	1.24 H	151	37.20	-9.60
6	778.89	28.3 QP	46.0	-17.7	1.24 H	13	31.60	-3.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.60	36.4 QP	40.0	-3.6	1.24 V	225	51.00	-14.60
2	51.24	34.0 QP	40.0	-6.0	1.24 V	12	48.00	-14.00
3	121.10	30.8 QP	43.5	-12.7	1.00 V	188	46.80	-16.00
4	375.29	25.5 QP	46.0	-20.5	1.24 V	114	36.60	-11.10
5	499.48	25.4 QP	46.0	-20.6	1.00 V	125	34.30	-8.90
6	778.89	27.8 QP	46.0	-18.2	1.75 V	302	31.10	-3.30

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100612	Sep. 30, 2014	Sep. 29, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 13, 2014	Feb. 12, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 2015
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

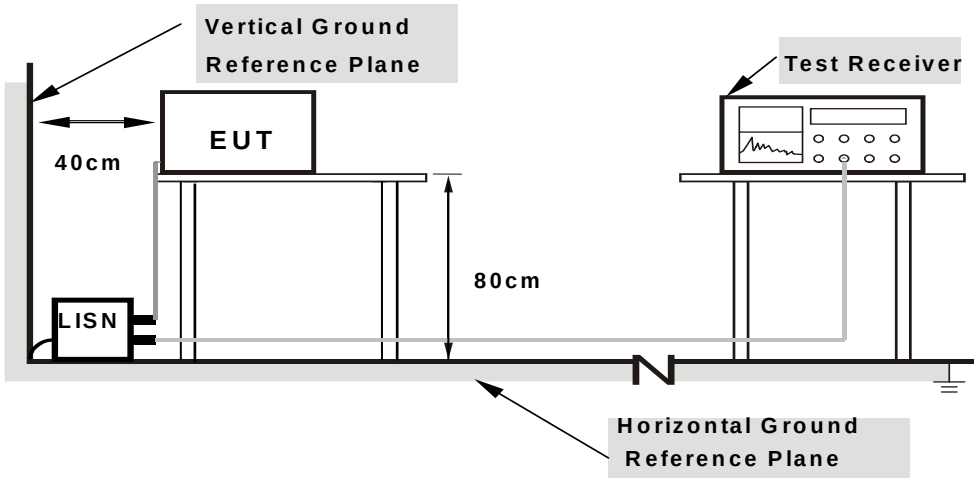
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

4.2.7 TEST RESULTS

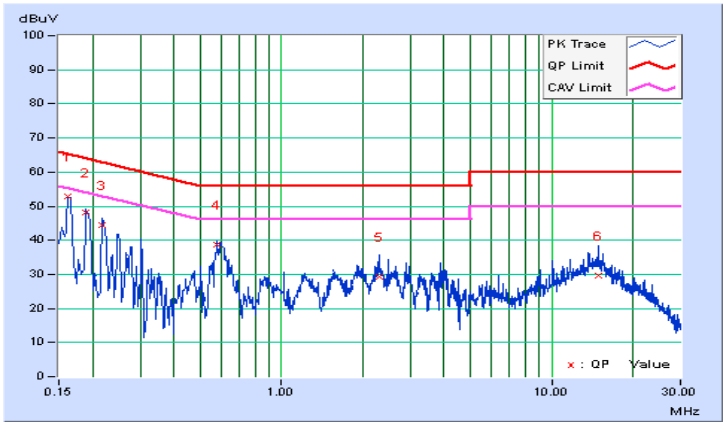
CONDUCTED WORST-CASE DATA: 802.11a

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16181	0.08	52.84	40.26	52.92	40.34	65.37	55.37	-12.45	-15.03
2	0.18953	0.07	48.06	35.96	48.13	36.03	64.06	54.06	-15.93	-18.03
3	0.21679	0.07	44.31	33.21	44.38	33.28	62.94	52.94	-18.56	-19.66
4	0.57924	0.09	38.62	29.96	38.71	30.05	56.00	46.00	-17.29	-15.95
5	2.30050	0.16	28.99	22.79	29.15	22.95	56.00	46.00	-26.85	-23.05
6	14.94935	0.77	28.76	22.20	29.53	22.97	60.00	50.00	-30.47	-27.03

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

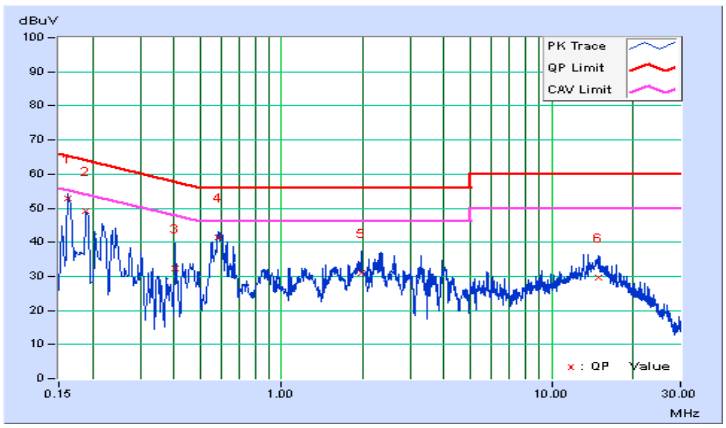


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16181	0.05	52.81	41.65	52.86	41.70	65.37	55.37	-12.51	-13.67
2	0.18953	0.05	49.12	38.84	49.17	38.89	64.06	54.06	-14.89	-15.17
3	0.40415	0.07	32.26	21.39	32.33	21.46	57.77	47.77	-25.44	-26.31
4	0.58384	0.08	41.27	29.44	41.35	29.52	56.00	46.00	-14.65	-16.48
5	1.96815	0.14	30.78	23.90	30.92	24.04	56.00	46.00	-25.08	-21.96
6	14.92980	0.67	28.80	22.07	29.47	22.74	60.00	50.00	-30.53	-27.26

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

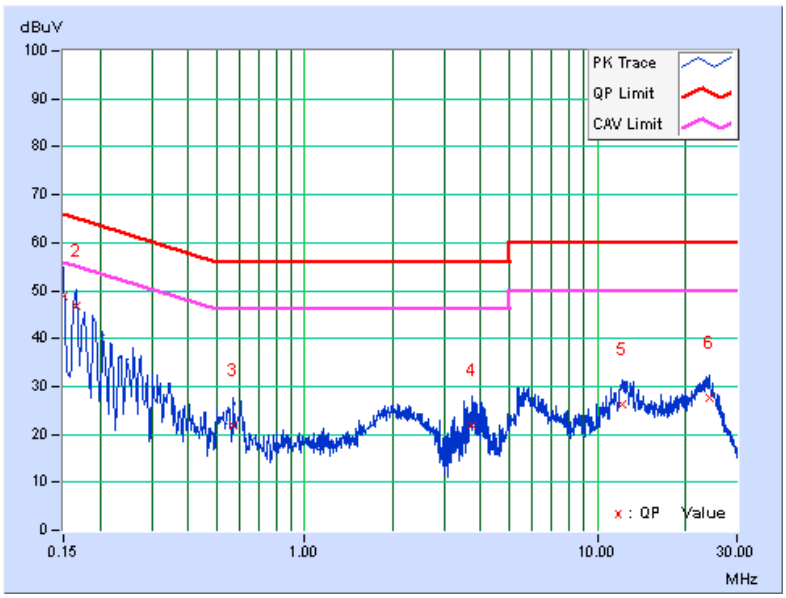


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.08	48.63	34.05	48.71	34.13	66.00	56.00	-17.29	-21.87
2	0.16564	0.08	46.65	33.82	46.73	33.90	65.18	55.18	-18.45	-21.28
3	0.57228	0.09	21.88	14.63	21.97	14.72	56.00	46.00	-34.03	-31.28
4	3.75111	0.22	21.50	11.59	21.72	11.81	56.00	46.00	-34.28	-34.19
5	12.20844	0.63	25.67	20.41	26.30	21.04	60.00	50.00	-33.70	-28.96
6	24.07529	1.16	26.45	21.08	27.61	22.24	60.00	50.00	-32.39	-27.76

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

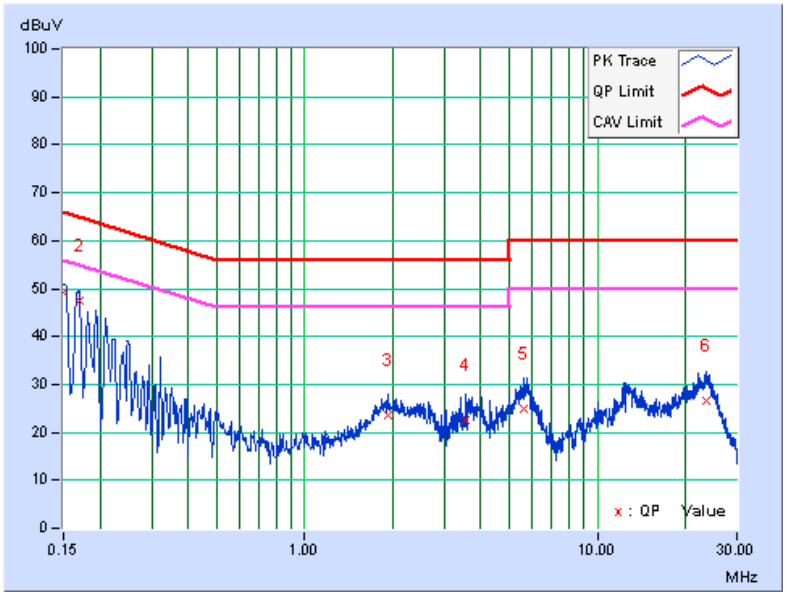


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	49.09	35.78	49.14	35.83	66.00	56.00	-16.86	-20.17
2	0.16955	0.05	47.38	33.14	47.43	33.19	64.98	54.98	-17.55	-21.79
3	1.93296	0.14	23.33	18.74	23.47	18.88	56.00	46.00	-32.53	-27.12
4	3.56734	0.19	22.24	14.26	22.43	14.45	56.00	46.00	-33.57	-31.55
5	5.57708	0.27	24.78	20.37	25.05	20.64	60.00	50.00	-34.95	-29.36
6	23.45751	0.99	25.50	20.03	26.49	21.02	60.00	50.00	-33.51	-28.98

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

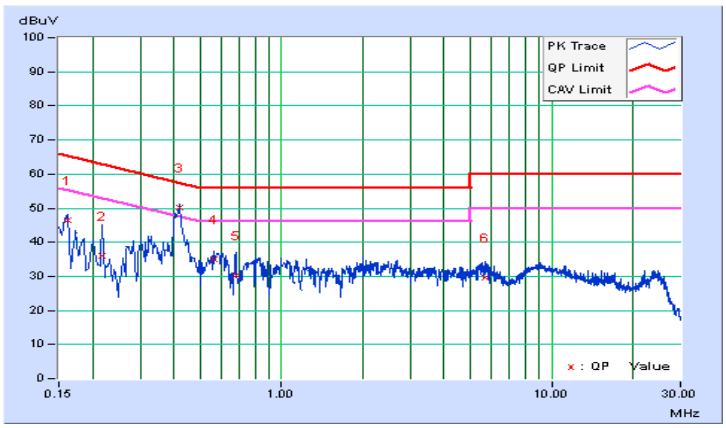


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	C		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16173	0.08	46.53	37.16	46.61	37.24	65.37	55.37	-18.77	-18.14
2	0.21647	0.07	35.83	26.56	35.90	26.63	62.95	52.95	-27.05	-26.32
3	0.41979	0.08	50.01	44.61	50.09	44.69	57.45	47.45	-7.36	-2.76
4	0.56418	0.09	34.97	31.33	35.06	31.42	56.00	46.00	-20.94	-14.58
5	0.67785	0.09	30.37	20.68	30.46	20.77	56.00	46.00	-25.54	-25.23
6	5.66701	0.31	29.27	22.01	29.58	22.32	60.00	50.00	-30.42	-27.68

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

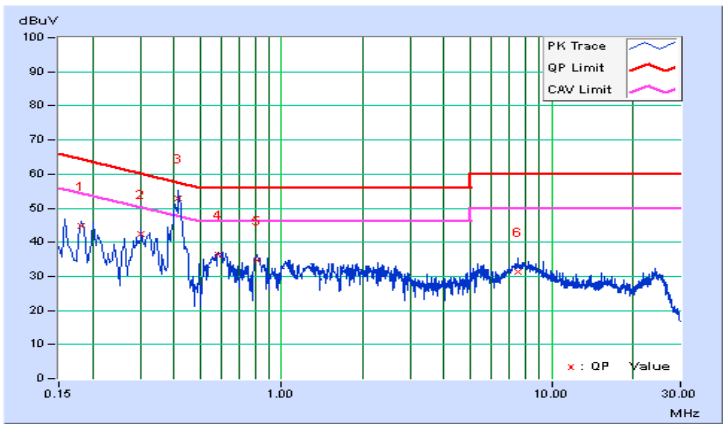


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	C		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18122	0.05	44.82	36.04	44.87	36.09	64.43	54.43	-19.56	-18.34
2	0.30249	0.06	42.28	37.92	42.34	37.98	60.17	50.17	-17.83	-12.19
3	**0.41560**	**0.07**	**52.92**	**44.88**	**52.99**	**44.95**	**57.54**	**47.54**	**-4.55**	**-2.59**
4	0.58384	0.08	36.16	32.54	36.24	32.62	56.00	46.00	-19.76	-13.38
5	0.81079	0.08	34.59	29.88	34.67	29.96	56.00	46.00	-21.33	-16.04
6	7.48516	0.34	30.91	25.85	31.25	26.19	60.00	50.00	-28.75	-23.81

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



4.3 TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW (21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
	√	Indoor Access Point	1 Watt (30 dBm)
		Mobile and Portable client device	250mW (24 dBm)
U-NII-2A		---	250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C		---	250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3		---	1 Watt (30 dBm)

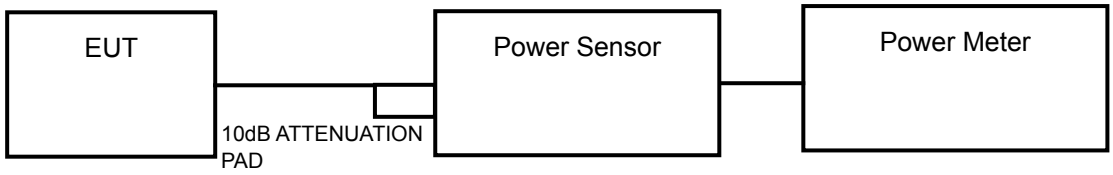
*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.3.4 TEST PROCEDURE

FOR AVERAGE POWER MEASUREMENT

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.3.7 TEST RESULTS

POWER OUTPUT:

802.11a

CHAN.	CHAN. FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
36	5180	19.84	19.92	19.48	283.274	24.52	30	PASS
40	5200	22.79	23.16	23.03	598.031	27.77	30	PASS
48	5240	22.56	22.17	21.96	502.154	27.01	30	PASS

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
36	5180	18.52	18.62	18.51	214.857	23.32	30	PASS
40	5200	22.82	23.18	23.04	**600.768**	27.79	30	PASS
48	5240	22.14	21.98	22.24	488.937	26.89	30	PASS

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
38	5190	14.58	15.52	15.12	96.862	19.86	30	PASS
46	5230	21.81	21.45	21.17	422.26	26.26	30	PASS

4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
	√	Indoor Access Point	
		Mobile and Portable client device	11dBm/ MHz
U-NII-2A		---	11dBm/ MHz
U-NII-2C		---	11dBm/ MHz
U-NII-3		---	30dBm/ MHz

4.4.2 TEST SETUP

4.4.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.4.4 TEST PROCEDURES

Using method SA-2

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 30 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3) Set Channel power measure = 1MHz
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value and add 10 log (1/duty cycle)

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6.

4.4.7 TEST RESULTS

802.11a

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2					
36	5180	5.01	7.22	8.06	11.72	0.10	11.82	15.10	PASS
40	5200	7.46	7.55	8.95	12.81	0.10	12.91	15.10	PASS
48	5240	8.83	8.70	9.29	13.72	0.10	13.82	15.10	PASS

NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-1 Band:**
   Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20}$)^2/3]= 7.90 dBi > 6dBi, so the power density limit shall be reduced to 17-(7.9-6) = 15.10dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2					
36	5180	5.36	5.56	6.75	10.70	0.12	10.82	15.10	PASS
40	5200	8.93	8.06	9.10	13.49	0.12	13.61	15.10	PASS
48	5240	8.69	8.08	9.08	13.41	0.12	13.53	15.10	PASS

NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-1 Band:**
   Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20}$)^2/3]= 7.90 dBi > 6dBi, so the power density limit shall be reduced to 17-(7.9-6) = 15.10dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (40MHz)

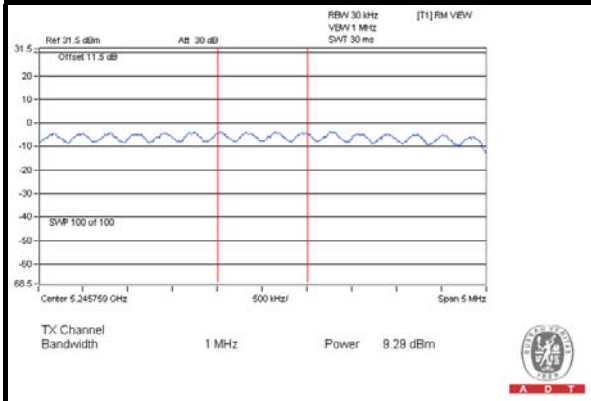
CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2					
38	5190	-0.88	-1.43	0.19	4.11	0.16	4.27	15.10	PASS
46	5230	5.26	4.56	5.32	9.83	0.16	9.99	15.10	PASS

NOTE:

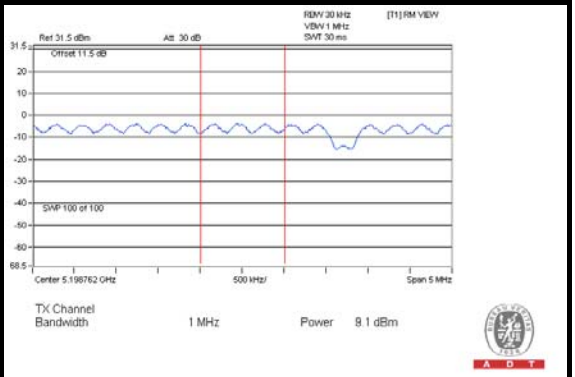
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-1 Band:**
   Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20}$)^2/3]= 7.9 dBi > 6dBi, so the power density limit shall be reduced to 17-(7.9-6) = 15.10dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

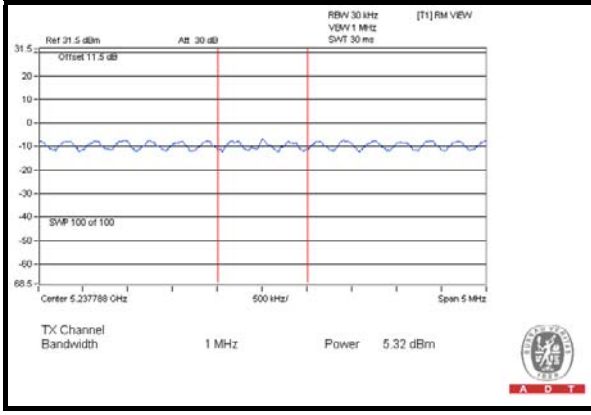
802.11a



802.11n (20MHz)



802.11n (40MHz)

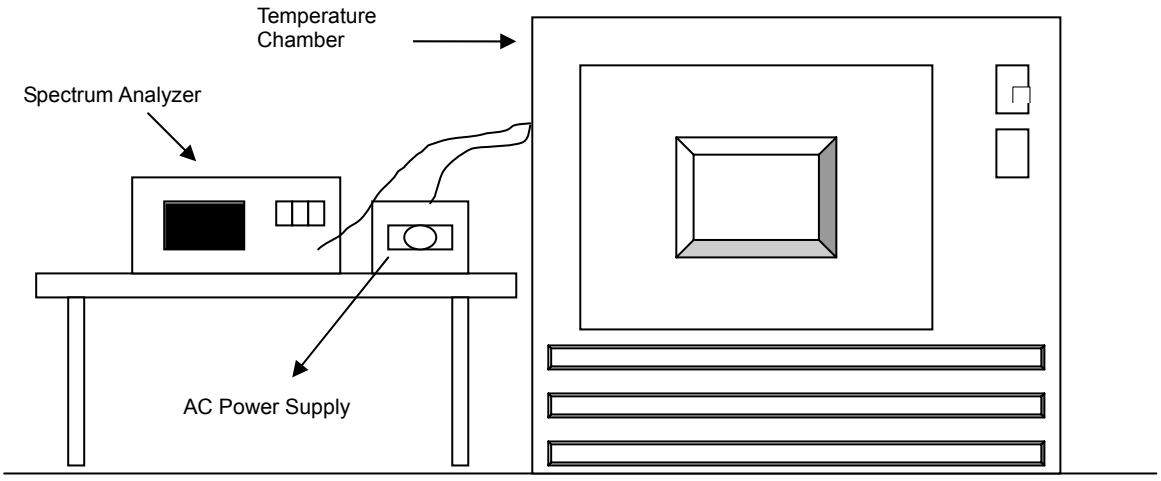


4.5 FREQUENCY STABILITY

4.5.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency of the carrier signal shall be maintained within band of operation

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.5.4 TEST PROCEDURE

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.

b. Turn the EUT on and couple its output to a spectrum analyzer.

c. Turn the EUT off and set the chamber to the highest temperature specified.

d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.

e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.

f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Set the EUT transmit at un-modulation mode to test frequency stability.

4.5.7 TEST RESULTS

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5200MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5200.0017	0.00003	5199.9994	-0.00001	5199.9995	-0.00001	5200.0027	0.00005
40	120	5200.0115	0.00022	5200.0118	0.00023	5200.0101	0.00019	5200.0121	0.00023
30	120	5200.0018	0.00003	5200.0006	0.00001	5200.0021	0.00004	5199.9998	0.00000
20	120	5199.9766	-0.00045	5199.9742	-0.00050	5199.9735	-0.00051	5199.9752	-0.00048
10	120	5200.0083	0.00016	5200.0086	0.00017	5200.0086	0.00017	5200.0089	0.00017
0	120	5199.9937	-0.00012	5199.9928	-0.00014	5199.9918	-0.00016	5199.9956	-0.00008
-10	120	5199.9835	-0.00032	5199.9832	-0.00032	5199.9841	-0.00031	5199.9821	-0.00034
-20	120	5199.9825	-0.00034	5199.9801	-0.00038	5199.9779	-0.00043	5199.9787	-0.00041
-30	120	5200.0112	0.00022	5200.0149	0.00029	5200.0153	0.00029	5200.0147	0.00028

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5200MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5199.9767	-0.00045	5199.9751	-0.00048	5199.973	-0.00052	5199.9743	-0.00049
	120	5199.9766	-0.00045	5199.9742	-0.00050	5199.9735	-0.00051	5199.9752	-0.00048
	102	5199.9768	-0.00045	5199.9732	-0.00052	5199.9728	-0.00052	5199.9744	-0.00049

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

7. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

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